

WHAT IS CLAIMED IS:

1. 1. A method for finding one or more target biometric samples that are similar to  
2. or match a query biometric sample, comprising:
  3. generating a query feature vector from a query biometric vector that  
4. represents said query biometric sample, said query feature vector comprising a  
5. plurality of features and said query biometric vector comprising a set of  
6. characteristics; and
  7. comparing said query feature vector to a plurality of target feature vectors,  
8. each target feature vector representing a respective target biometric sample;  
9. wherein,
    10. a target biometric sample is a potential match to said query biometric sample  
11. when a threshold number of features in the target feature vector that corresponds to  
12. said target biometric sample are identical to features in said query biometric vector.
1. 2. The method of claim 1, wherein the generating comprises:
  2. extracting a set of tiles that represents said query biometric sample, each tile  
3. including a plurality of characteristics;
  4. assigning an identification element to each said tile in said set of tiles;
  5. selecting a predetermined number of the identification elements;
  6. partitioning the selected identification elements into a plurality of partitioned  
7. groups; and
  8. applying a fingerprint function to each partitioned group to generate a set of  
9. features, said set of features representing said query feature vector.
1. 3. The method of claim 2, wherein said extracting step further comprises:
  2. canonicalizing each characteristic associated with said query biometric  
3. sample to create a plurality of canonicalized characteristics; and
  4. obtaining a pseudo randomly selected subset of said plurality of  
5. canonicalized characteristics to form each said plurality of characteristics included in  
6. said set of tiles.

1    4.    The method of claim 3, wherein a characteristic associated with said query  
2    biometric sample is a variable characteristic and said canonicalizing step includes  
3    expansion of said variable characteristic using a predetermined function.

1    5.    The method of claim 3, wherein said canonicalization of each said  
2    characteristic associated with said query biometric sample includes application of a  
3    respective weight to each said characteristic, the respective weight determining a  
4    number of copies of said characteristic that are present in said plurality of  
5    canonicalized characteristics.

1    6.    The method of claim 1, wherein each target feature vector in said plurality of  
2    target feature vectors is generated by:

3                 extracting a set of tiles that represent a respective target biometric sample,  
4    each tile including a plurality of characteristics;  
5                 assigning an identification element to each said tile in said set of tiles;  
6                 selecting a predetermined number of the identification elements;  
7                 partitioning the selected identification elements into a plurality of groups; and  
8                 applying a fingerprint function to each group to generate a set of features,  
9    said set of features representing said target feature vector.

1    7.    The method of claim 6, wherein said extracting step further comprises:  
2                 canonicalizing the characteristics associated with said respective biometric  
3    sample to create a plurality of canonicalized characteristics; and  
4                 obtaining a pseudo randomly selected subset of said plurality of  
5    canonicalized characteristics to form each said plurality of characteristics included in  
6    said set of tiles.

1    8.    The method of claim 7, wherein a characteristic associated with said  
2    respective biometric sample is a variable characteristic and said canonicalizing step  
3    includes expansion of said variable characteristic using a predetermined function.

1    9.    The method of claim 7, wherein said canonicalization of each said  
2    characteristic associated with said respective biometric sample includes application

3 of a respective weight to each said characteristic, the respective weight determining  
4 a number of copies of said characteristic that are present in said plurality of  
5 canonicalized characteristics.

1 10. The method of claim 2, wherein the selecting includes selecting the  
2 identification elements using a selection function.

1 11. The method of claim 6, wherein the selecting includes selecting the  
2 identification elements using a selection function.

1 12. The method of claim 2, wherein each of the set of features is a one-way hash  
2 of a group.

1 13. The method of claim 6, wherein each of the set of features is a one-way hash  
2 of a group.

1 14. The method of claim 1, wherein the comparing includes:  
2 extracting from a database a set of target feature vectors, each extracted  
3 target feature vector including at least one feature that is in common with a feature  
4 in said query feature vector;  
5 locating each target feature vector in the set of target feature vectors in a  
6 count hash table, the count hash table including target feature vector identifications  
7 corresponding to target feature vectors that share at least one feature in common  
8 with the target feature vector, the count hash table including a count of matching  
9 features for each target feature vector represented by the table; and  
10 incrementing the count of matching features for each located target feature  
11 identification.

1 15. A computer program product for use in conjunction with a computer system,  
2 the computer program product comprising a computer readable medium and a  
3 computer program mechanism embedded therein, the computer program  
4 mechanism comprising:

5        a data structure including a plurality of target feature vectors, each target  
6        feature vector representing a respective target biometric sample;  
7            a module for finding one or more said respective target biometric samples  
8        that are similar to or match a query biometric sample, said module including  
9        instructions for:  
10            generating a query feature vector from a query biometric vector that  
11        represents said query biometric sample, said query feature vector comprising a  
12        plurality of features and said query biometric vector comprising a set of  
13        characteristics; and  
14            comparing said query feature vector to said plurality of target feature vectors;  
15        wherein,  
16            a target biometric sample is a potential match to said query biometric sample  
17        when a threshold number of features in the target feature vector that corresponds to  
18        said target biometric sample are identical to features in said query biometric vector.  
19  
20  
21        16. The computer program product of claim 15, wherein the instructions for  
22        generating comprise:  
23            instructions for extracting a set of tiles that represents said query biometric  
24        sample, each tile including a plurality of characteristics;  
25            instructions for assigning an identification element to each said tile in said set  
26        of tiles;  
27            instructions for selecting a predetermined number of the identification  
28        elements;  
29            instructions for partitioning the selected identification elements into a plurality  
30        of partitioned groups; and  
31            instructions for applying a fingerprint function to each partitioned group to  
32        generate a set of features, said set of features representing said query feature  
33        vector.  
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1        17. The computer program product of claim 20, wherein said instructions for  
2        extracting further comprise:  
3            instructions for canonicalizing each characteristic associated with said query  
4        biometric sample to create a plurality of canonicalized characteristics; and

5 instructions for obtaining a pseudo randomly selected subset of said plurality  
6 of canonicalized characteristics to form each said plurality of characteristics included  
7 in said set of tiles.

1 18. The computer program product of claim 17, wherein a characteristic  
2 associated with said query biometric sample is a variable characteristic and said  
3 instructions for canonicalizing includes expansion of said variable characteristic  
4 using a predetermined function.

1 19. The computer program product of claim 17, wherein said instructions for  
2 canonicalization of each said characteristic associated with said respective biometric  
3 sample includes application of a respective weight to each said characteristic, the  
4 respective weight determining a number of copies of said characteristic that are  
5 present in said plurality of canonicalized characteristics.

20. The computer program product of claim 15, wherein said module further includes instructions for creating each target feature vector in said plurality of target feature vectors, said instructions for creating including:

instructions for extracting a set of tiles that represent a respective target biometric sample, each tile including a plurality of characteristics;

6 instructions for assigning an identification element to each said tile in said set  
7 of tiles;

8 instructions for selecting a predetermined number of the identification  
9 elements;

instructions for partitioning the selected identification elements into a plurality of groups; and

instructions for applying a fingerprint function to each group to generate a set of features, said set of features representing said target feature vector.

1 21. The computer program product of claim 20, wherein said instructions for  
2 extracting further comprise:

3 instructions for canonicalizing the characteristics associated with said  
4 respective biometric sample to create a plurality of canonicalized characteristics; and

5       instructions for obtaining a pseudo randomly selected subset of said plurality  
6 of canonicalized characteristics to form each said plurality of characteristics included  
7 in said set of tiles.

1     22.   The computer program product of claim 21, wherein a characteristic  
2 associated with said respective biometric sample is a variable characteristic and said  
3 instructions for canonicalizing include expansion of said variable characteristic using  
4 a predetermined function.

1     23.   The computer program product of claim 21, wherein said instructions for  
2 canonicalization of each said characteristic associated with said respective biometric  
3 sample includes application of a respective weight to each said characteristic, the  
4 respective weight determining a number of copies of said characteristic that are  
5 present in said plurality of canonicalized characteristics.

1     24.   The computer program product of claim 16, wherein said instructions for  
2 selecting include instructions for selecting the identification elements using a  
3 selection function.

1     25.   The computer program product of claim 20, wherein said instructions for  
2 selecting include instructions for selecting the identification elements using a  
3 selection function.

1     26.   The computer program product of claim 16, wherein each of the set of  
2 features is a one-way hash of a group.

1     27.   The computer program product of claim 20, wherein each of the set of  
2 features is a one-way hash of a group.

1     28.   The computer program product of claim 15, wherein the instructions for  
2 comparing include:

3       instructions for extracting from said data structure a set of target feature  
4   vectors, each extracted target feature vector including at least one feature that is in  
5   common with a feature in said query feature vector;  
6       instructions for locating each target feature vector in the set of target feature  
7   vectors in a count hash table, the count hash table including target feature vector  
8   identifications corresponding to target feature vectors that share at least one feature  
9   in common with the target feature vector, the count hash table including a count of  
10   matching features for each target feature vector represented by the table; and  
11       instructions for incrementing the count of matching features for each located  
12   target feature identification.

1   29.   A system for identifying potential matches between a query biometric sample  
2   and a plurality of target biometric samples comprising:

3       a memory storing a plurality of target feature vectors, each target feature  
4   vector representing a respective target biometric sample in said plurality of target  
5   biometric samples;

6       a central processing unit for executing a software module, the software  
7   module including instructions for:

8       generating a query feature vector from a query biometric vector, said query  
9   biometric vector representing said query biometric sample, said query feature vector  
10   comprising a plurality of features and said query biometric vector comprising a set of  
11   characteristics; and

12       comparing said query feature vector to said plurality of target feature vectors;  
13   wherein,

14       a target biometric sample is a potential match to said query biometric sample  
15   when a threshold number of features in the target feature vector that corresponds to  
16   said target biometric sample are identical to features in said query biometric vector.